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Acute care hospitalization of refugees to Canada: Linked data for immigrants from Poland, Vietnam and the Middle East

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Abstract

Background: Refugees arrive in Canada with settlement challenges different from those faced by other immigrants, including a higher risk of poor health. This study reports hospitalization rates for the three fiscal years from 2006/2007 through 2008/2009 for immigrants who arrived during the 1980-to-2006 period, with a focus on three refugee groups.

Methods: Information from two linked databases was used to estimate age-standardized hospitalization rates (ASHRs) per 10,000 population aged 30 or older for all causes (excluding pregnancy) and for leading causes, by immigrant category and by refugee subcategory. The analysis focused on refugees from Poland, Vietnam and the Middle East, whose hospitalization rates were compared with those of the Canadian-born population and/or economic class immigrants from the same source areas.

Results: Immigrants aged 30 or older, including refugees, had significantly lower all-cause ASHRs than did the Canadian-born population. All-cause ASHRs were 470 per 10,000 for immigrants overall and 494 for refugees, compared with 891 for the Canadian-born. Of the three source areas, immigrants and refugees from Vietnam had lower ASHRs. The circulatory disease-specific ASHR for government-assisted refugees from the Middle East was similar to that of the Canadian-born population (142 and 158, respectively). Except for those from Poland, refugees typically had higher ASHRs than did their economic class counterparts.

Interpretation: Refugees, like other immigrants, generally had lower hospitalization rates than did the Canadian-born population, but some subgroups were particularly susceptible to hospitalization for specific chronic diseases.

Key words: Data linkage, health care utilization, immigrant category, migration

Relatively little information is available at the national level about the health of refugees in Canada.[1,2] Evidence from the Longitudinal Survey of Immigrants to Canada showed that refugees were more likely than other immigrants to report poor health.[3,4] Possible explanations include hardships associated with the involuntary nature of their migration and post-migration difficulty obtaining support and health care.[5]

Efforts to monitor refugee health often focus on infectious diseases[6,7] and mental health.[8,9] However, a recent review of refugee health research identified data gaps for chronic conditions, especially cardiovascular diseases.[10] Internationally, the focus has shifted to non-communicable and chronic diseases as refugee health concerns[11,12] in transitory places of asylum[13] and in the country of settlement.[14,15] Provincial research in Canada has found an elevated risk of chronic diseases among refugees, compared with other immigrants or established residents (Canadian-born and long-term immigrants combined), but comparisons with the total Canadian-born population have been presented only in mortality studies.[16-18] Furthermore, no quantitative examination of the health of refugees, compared with their counterparts in other immigrant categories from the same areas, has been conducted.

Over the years, Canada experienced several refugee "waves."[19] In the late 1970s and early 1980s, about 60,000 people from Vietnam arrived as refugees. The 1980s saw an influx from Poland as a result of the political/economic crisis in that country.[20,21] In recent years, refugees arrived from Afghanistan, Iran, Iraq and Syria.[22]

Because Canada's immigration policy regarding refugees aims to balance humanitarian concerns with the need to protect the health of the general public, it is important to understand their health and health care requirements. An examination of hospitalization patterns among refugees from areas that have been sources of "waves" offers insight into their settlement. This is especially pertinent in view of the arrival of refugees from the Middle East, notably Syria, since 2011.

This study uses information from the Immigrant Landing File and the 2006 Census of Population linked to the Discharge Abstract Database to compare age-standardized hospitalization rates of refugees with those of other immigrants and the Canadian-born population. By comparing refugees with other categories of immigrants from the same area, it is possible to control for variations in area-specific health conditions.

Data and methods

Data linkage

The Immigrant Landing File (ILF), a national database provided annually by Immigration, Refugees and Citizenship Canada (IRCC) (formerly Citizenship and Immigration Canada) to Statistics Canada, is a census of immigrants who entered Canada since 1980. The information includes time of entry, source country and immigration category.[23] Annual records for 1980 through 2006 were used for this analysis.

The Discharge Abstract Database (DAD) is a census of discharges from public hospitals in Canada (excluding Quebec), provided to Statistics Canada by the Canadian Institute for Health

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Information.[24] It contains demographic, administrative and clinical data for about 3 million hospital records annually (fiscal year April 1 through March 31). Hospital discharges that occurred from 2006/2007 through 2008/2009 were used in this analysis.

The ILF and DAD were linked with a deterministic exact matching process using the 2006 Census as a "bridge" file; this was possible because the 2006 Census had been linked to the ILF and to the DAD (2006/2007 through 2008/2009) for two previous projects.[25,26] Validation concluded that the linked file was representative of immigrants who arrived in Canada during the 1980-to-2006 period and of their hospitalization experiences.[27]

The long-form census is completed by about 20% of households. Some 4.6 million 2006 Census long-form respondents (excluding Quebec) were linked to the DAD for the three years from 2006/2007 through 2008/2009, based on birthdate, sex and residential postal code.

Both linkages were approved by Statistics Canada's Executive Management Board.[28] Use of these linked data is governed by the *Directive on Record Linkage*.[29]

Statistics Canada ensures respondent privacy during linkage and subsequent use of the linked files. Only employees directly involved in the linkage process have access to the unique identifying information (such as name and sex) and do not access health-related information. When the linkage is completed, an analytical file is created from which the identifying information has been removed. This de-identified file is accessed by analysts for validation and analysis.

Two study cohorts were created, representing individuals aged 30 or older in the ILF-DAD (n = 1,918,300) and in the Census-DAD (n = 2,012,300). The ILF-DAD and Census-DAD cohorts were used to calculate hospitalization rates for immigrants by immigrant category, and for the Canadian-born population, respectively.

Refugees

The immigrant categories examined in this study were economic class, family class and refugees[30] and their dependants.

The Canadian refugee system has two main programs: the Refugee and Humanitarian Resettlement Program for people seeking protection from outside Canada and the In-Canada Asylum Program for people making refugee protection claims from within Canada. For this analysis, refugees applying from outside Canada were subdivided into those assisted by the federal government and those who were privately sponsored. People who sought refugee status after arrival in Canada and were successful in their claims were categorized as refugees landed in Canada. In 2013, the Blended Visa Office-Referred (BVOR) Program was launched to match refugees identified for resettlement by the United Nations Refugee Agency with private sponsors in Canada. The BVOR category is not relevant in the present analysis.

Historically, the health impact of immigration has been a concern, especially the need to contain infectious diseases. The *1976 Immigration Act* was the foundation of a modernized set of policies that reflected non-discrimination and inter-sectoral collaboration, including health.[30] The *Act* required that all foreign nationals (immigrants and refugees) be screened for reasons of public health and safety. Admission to Canada was contingent upon passing the "excessive demand" test; specifically, that they might not reasonably be expected to place excessive demand on the Canadian health care system.

The "excessive demand" clause was re-affirmed by the *2002 Immigrant and Refugee Protection Act*.[31] "Excessive demand" is defined in the *Immigration and Refugee Protection Regulations (IRPR)* as a demand on health services or social services:

a) for which anticipated costs would likely exceed average Canadian per capita health services and social services costs over the five consecutive years immediately following the most recent medical examination required by the IRPR, unless there is evidence that significant costs are likely to be incurred beyond that period, in which case the period is no more than ten consecutive years; or

b) that would add to existing waiting lists and would increase the rate of mortality and morbidity in Canada as a result of an inability to provide timely services to Canadian citizens or permanent residents.

However, the "excessive demand" grounds of inadmissibility do not apply in the case of a foreign national who:

a) is a member of the family class (spouse, common-law partner or child of a sponsor seeking permanent residence);

b) has applied for permanent residence as a Convention refugee or a person in similar circumstances; or

c) is a protected person.

Consequently, since 2002, refugees and some family class immigrants may not be barred from Canada based on excessive demand.

While this study presents information for all refugees, those from Poland, Vietnam and the Middle East are highlighted. Poland and Vietnam were selected because they are the major source countries of refugees in the ILF-DAD dataset (followed by Sri Lanka, Bosnia, El Salvador, Afghanistan, Iran and Iraq). In view of the emerging importance of refugees from the Middle East and West Asia, those from Afghanistan, Iran, Iraq and Syria were combined (Middle East). Inclusion of the few from Syria identified in the dataset reflects the need to understand the potential impact of the recent influx of Syrian refugees when data become available.

Landing year was dichotomized as 1991 or earlier and 1992 or later, based on the landing date close to the mid-point of the database. Age groups were defined as 30 to 44, 45 to 59, and 60 or older.

Statistical methods

Descriptive statistics were used to profile the immigrant and refugee populations in the ILF-DAD overall and those from Poland, Vietnam, and the Middle East. Corresponding data for the Canadian-born population were from the Census-DAD cohort.

The primary outcome was inpatient acute care hospitalizations discharged from April 1, 2006 through March 31, 2009. Age-standardized hospitalization rates (ASHRs) were annualized and derived for all causes combined (excluding pregnancy) and the three leading causes, based on the most responsible diagnosis, according to the *International Classification of Diseases Version 10*.[32] The three leading causes were: circulatory diseases (ICD10 codes I00 to I93), digestive diseases (ICD10 codes K00 to K93) and cancer (ICD10 codes C00 to D48). The Canadian-born population was the reference population for overall comparisons. Economic immigrants were the reference population for area-specific analyses. The age structure of the Canadian population was used for age-standardization. Differences in ASHRs were tested using logarithmic transformation to adjust for rare events.[33]

Table 1
Selected characteristics of immigrants in linked Immigrant Landing File (1980 through 2006)-Discharge Abstract Database (2006/2007 through 2008/2009) and Canadian-born in linked 2006 Census-Discharge Abstract Database, population aged 30 or older, Canada excluding Quebec

Characteristic	Immigrants		Canadian-born
	Total	Refugees	
Number	1,918,300	272,900	9,794,200 (2,012,300)[§]
		%	
Age group			
30 to 44	49	50	36
45 to 59	35	42	37
60 or older	15	8	27
Male	47	56	48
Immigrant category			
Refugee	14	...	...
Government-assisted	...	41	...
Privately sponsored	...	31	...
Landed in Canada	...	25	...
Dependant	...	4	...
Economic	36	...	...
Family	45	...	...
Other[†]	5	...	...
Landing year			...
1980 to 1991	37	52	...
1992 to 2006	63	48	...
Source area			...
Poland	4	15	...
Vietnam	4	15	...
Middle East	4	11	...
Other	89	59	...

... not applicable
[§] weighted census population (sample size)
[†] includes foreign nationals admitted on humanitarian and compassionate grounds who do not qualify in any immigrant category
Sources: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009); 2006 Census linked to Discharge Abstract Database (2006/2007 through 2008/2009).

Results

Description of cohorts

Compared with the Canadian-born population aged 30 or older, immigrants in the ILF-DAD, especially refugees, were relatively young (Table 1). About a quarter (27%) of the Canadian-born were aged 60 or older versus 15% of immigrants overall and 8% of refugees.

Men made up fewer than half the Canadian-born population (48%) and ILF-DAD immigrants overall (47%); by contrast, 56% of refugees were men.

Almost two-thirds (63%) of immigrants in the ILF-DAD arrived after 1991. The family class accounted for 45% of immigrants in the ILF-DAD; 36% were economic immigrants; and 14% were refugees. Of refugees, 41% were government-sponsored; 31% were privately sponsored; and 25% had claimed refugee status from within Canada. Together, Poland, Vietnam and the Middle East represented 41% of refugees, but 12% of ILF-DAD immigrants overall.

Reflecting the refugee waves of the late 1970s and early 1980s, more than 90% of refugees from Poland and Vietnam had arrived in Canada before 1992; the corresponding figure for refugees from the Middle East was 32% (Table 2).

More than half (57%) of Vietnamese refugees were government-assisted, compared with 30% of Polish refugees and 47% of refugees from the Middle East. The percentage who sought refugee status after arriving in Canada was sizeable only among those from the Middle East—22%.

Age-standardized hospitalization rates

Immigrants were much less likely than the Canadian-born population to be hospitalized during the 2006/2007-to-2008/2009 period. The ASHR among ILF-DAD immigrants overall was 470 per 10,000 population: 389, 494 and 508 for those in the economic, refugee and family categories, respectively (Table 3). All rates were substantially below that of the Canadian-born (891).

Refugees tended to have higher ASHRs than did economic immigrants, especially for circulatory and digestive diseases. ASHRs for government-assisted and privately sponsored refugees were similar, but ASHRs for those who made refugee claims from within Canada were often higher, especially for circulatory diseases (Appendix Table A).

Table 2
Selected characteristics of immigrants and refugees aged 30 or older in linked Immigrant Landing File (1980 through 2006)-Discharge Abstract Database (2006/2007 through 2008/2009), by source area, Canada excluding Quebec

	Poland		Vietnam		Middle East[§]		Other	
Characteristic	Total immigrants	Refugees	Total immigrants	Refugees	Total immigrants	Refugees	Total immigrants	Refugees
Number	69,800	41,490	77,580	40,710	72,350	31,060	1,698,570	159,650
Age group								
30 to 44	37	33	48	46	51	55	50	55
45 to 59	52	59	36	46	36	36	35	37
60 or older	11	7	16	9	13	9	15	8
% male	48	59	48	60	53	57	47	54
Immigrant category								
Refugees	59	...	52	...	43	...	9	...
Government-assisted	...	29	...	57	...	47	...	38
Privately sponsored	...	70	...	43	...	30	...	18
Landed in Canada	...	0	...	0	...	22	...	38
Dependant	...	0	...	0	...	2	...	6
Economic	28	...	37	...	15	...	37	...
Family	11	...	10	...	34	...	48	...
Other[†]	1	...	0	...	8	...	6	...
Landing year								
1980 to 1991	75	92	74	93	27	32	35	35
1992 to 2006	25	8	26	7	73	68	65	66

... not applicable
[§] Afghanistan, Iran, Iraq, Syria
[†] includes foreign nationals admitted on humanitarian and compassionate grounds who do not qualify in any immigrant category
Source: Immigrant Landing file (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009).

Table 3
All-cause (excluding pregnancy) and leading cause-specific age-standardized[§] hospitalization rates (ASHRs) per 10,000 population aged 30 or older, by immigrant category and source area, Canadian-born population and immigrants, Canada excluding Quebec, 2006/2007 through 2008/2009

	All-cause			Circulatory diseases			Digestive diseases			Cancer		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
	ASHR	from	to	ASHR	from	to	ASHR	from	to	ASHR	from	to
Canadian-born[†]	891.2	890.1	892.3	157.7	157.3	158.2	114.5	114.1	114.9	86.0	85.7	86.4
Immigrant category												
Refugee	493.5*	486.5	500.6	97.8*	94.5	101.2	67.0*	64.5	69.6	58.7*	56.4	61.1
Family	507.5*	504.3	510.7	94.4*	93.1	95.9	63.2*	62.1	64.4	59.8*	58.7	60.9
Economic	389.1*	385.4	392.9	68.5*	66.8	70.1	52.9*	51.6	54.2	60.8*	59.4	62.2
Source area												
Poland	488.1*	476.1	500.4	106.6*	100.7	112.8	60.0*	56.1	64.3	67.1*	62.9	71.6
Vietnam	385.8*	376.6	395.3	55.9*	52.4	59.7	51.5*	48.2	55.0	59.7*	56.3	63.4
Middle East	510.3*	498.6	522.4	109.4*	103.8	115.4	65.9*	61.9	70.1	56.1*	52.4	60.1
Total Immigrant Landing File immigrants[††]	470.4*	468.3	472.5	88.4*	87.4	89.3	60.6*	59.9	61.4	59.7*	59.0	60.5

* significantly different from reference category ($p < 0.05$)
[§] standardized to 2006 Census population
[†] reference category
[††] includes foreign nationals admitted on humanitarian and compassionate grounds who do not qualify in any immigrant category
Sources: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009); 2006 Census linked to Discharge Abstract Database (2006/2007 through 2008/2009).

Of refugees from the three source areas highlighted in this analysis, those from Vietnam had the lowest all-cause ASHR (386); rates were higher among refugees from Poland (488) and the Middle East (510) (Table 3). The low all-cause ASHR among Vietnamese refugees was largely attributable to their low circulatory disease-specific ASHR (56), compared with refugees from Poland (107) and the Middle East (109).

Refugees from Vietnam and the Middle East had higher all-cause ASHRs than did economic class refugees from the same areas. This held for circulatory diseases (both Vietnam and the Middle East) and for digestive diseases (Middle East only) (Table 4). By contrast, the ASHRs of Polish refugees were similar to those of their economic class counterparts.

Differences in refugees' ASHRs were greater between source areas than between refugee subcategories from the same area (Appendix Table B). For example, all-cause ASHRs for government-assisted refugees were 363 for those from Vietnam and 609 for those from the Middle East; ASHRs for government-assisted and privately supported refugees from Vietnam differed relatively little: 363 versus 390.

The circulatory disease-specific ASHR among government-assisted refugees from the Middle East (142) was the only ASHR that was not significantly below that of the Canadian-born population (158).

Discussion

This is the first national population-based study to focus on refugees and to compare hospitalization rates of those from major source areas. The analysis is based on linked data from the ILF-DAD and the Census-DAD, which are not widely available.

Hospitalization rates among immigrants were generally lower than those of the Canadian-born population, overall and for leading causes. This also applied to those from the selected refugee source areas.

Table 4
All-cause (excluding pregnancy) and leading cause-specific age-standardized[§] hospitalization rates (ASHRs) per 10,000 population aged 30 or older, refugees and economc immigrants from Poland, Vietnam or Middle East, Canada excluding Quebec, 2006/2007 through 2008/2009

	All-cause			Circulatory diseases			Digestive diseases			Cancer		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
	ASHR	from	to	ASHR	from	to	ASHR	from	to	ASHR	from	to
Poland												
Refugees	454.4	437.1	472.4	93.2	85.1	102.2	60.4	54.6	66.8	64.5	58.3	71.3
Economic[†]	501.5	465.9	539.8	116.3	98.8	136.8	64.4	52.6	78.9	69.5	57.7	83.8
Vietnam												
Refugees	375.4*	359.8	391.6	54.8*	48.8	61.5	52.7	47.1	59.0	59.2	53.5	65.5
Economic[†]	284.4	259.8	311.3	29.6	22.3	39.3	36.9	28.7	47.6	66.5	54.9	80.4
Middle East												
Refugees	605.8*	583.4	629.2	135.4*	124.4	147.4	76.9*	69.6	85.0	50.9	44.9	57.7
Economic[†]	403.9	383.1	425.8	75.1	66.0	85.5	56.1	48.8	64.6	62.7	55.0	71.5

* significantly different from reference category ($p < 0.05$)
[§] standardized to 2006 Census population
[†] reference category
Source: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009).

These low hospitalization rates are consistent with the "healthy immigrant effect," which hypothesizes that immigrants, especially recent arrivals, tend to be healthier than the local-born population. This could be due to self-selection, and also, to medical screening that favoured healthier individuals, systematically excluding applicants deemed medically inadmissible, at least until enactment of the *2002 IRPA*.[1,34] Recent findings, however, suggest that the "healthy immigrant effect" hides considerable heterogeneity stemming from factors such as place of birth[35,36] and circumstances surrounding departure from the source the country.[37] In this study, refugees were generally found to have higher hospitalization rates than did economic immigrants.[38]

Previous research based on linked ILF data found refugees' mortality risk to be higher than that of other immigrants, but lower than that of the Canadian-born population (except for specific diseases such as infectious and parasitic diseases, liver cancer and HIV AIDS).[18] A pilot study based on ILF data linked to health administration files in British Columbia and Manitoba showed that family class immigrants and refugees tended to have higher hospitalization rates than did other immigrants, but not always higher than those of other provincial residents.[16]

The findings of the present study support a 2016 analysis, which concluded that recent refugees from Syria were relatively healthy and posed no immediate health risk to Canada.[38] However, that analysis relied on self-reported data, which are susceptible to underreporting of poor health. As well, the authors noted that chronic health conditions are likely to emerge among these refugees over time.

The ILF-DAD results offer insight into potential chronic disease patterns, especially among refugees from the Middle East, whose circulatory disease-specific ASHR was relatively high. Previous research showed that immigrants to Ontario from Afghanistan and Iraq had relatively high hospitalization rates for major cardiovascular events.[39] The present study, too, found that the age-specific hospitalization rates among refugees from the Middle East were comparable to those of the Canadian-born; as these refugees were younger than the Canadian-born, this allows time for disease prevention before onset.

What is already known on this subject?

- While previous work on refugee health research often focused on infectious disease or on mental health issues, a recent review identified data gaps for non-communicable diseases and chronic conditions.
- In Canada, provincial research found an elevated risk of chronic diseases among refugees, but comparisons with the total Canadian-born population have been presented only in mortality studies.
- No quantitative examination of the health of refugees, compared with other immigrant categories from the same areas, has been conducted.

What does this study add?

- Information from two linked databases was used to estimate age-standardized hospitalization rates, by immigrant category and by refugee subcategory during the 2006/2007-to-2008/2009 period.
- The analysis focused on refugees from Poland, Vietnam and the Middle East.
- Hospitalization rates for immigrants overall and for those in the economic, refugee and family categories were substantially below that of the Canadian-born (891).
- Refugees tended to have higher hospitalization rates than did economic immigrants.

Limitations

Because the DAD does not contain information for Quebec, immigrants residing in that province, who make up about 17% of all ILF-DAD immigrants, were excluded from this study. As well, hospital discharges for only three fiscal

years were linked, and therefore, trends by category and by cohort could not be examined.

The analysis pertains to hospital use, which is an imperfect indicator of health status. A higher rate of use of other health services (for example, primary care) among refugees may contribute to lower hospitalization rates. For instance, an Ontario study found that recent refugees were more likely than long-term residents to use primary mental health care.[40]

Immigrants and refugees from Vietnam had relatively low hospitalization rates, compared with those from Poland and the Middle East. However, comparisons of refugee groups could be compromised by age-period-cohort effects. Most Vietnamese and Polish refugees arrived in Canada decades ago. The hospitalization data are for the 2006/2007-to-2008/2009 period, and differences in adaptation levels may influence hospital use. Changes in the health care system and the availability of primary care providers and the rising prevalence of obesity would be expected to affect groups who arrived at different times. Policy changes could also be important. The higher hospitalization rate among those from the Middle East, may, in part, be related to the implementation of the 2002 *Immigrant and Refugee Protection Act*, which allowed certain individuals with previously inadmissible health problems to enter Canada. These factors limit comparisons, even with age adjustment.

The constant flow of people into and out of Canada makes migration studies challenging. Immigrants are more likely than the Canadian-born population to emigrate and thereby bias the estimates. This applies particularly to economic immigrants, but less to refugees.[41] Nonetheless, the ILF-DAD linkage used the 2006 Census as a bridge file, which ensured that immigrants were in Canada on the date of the 2006 Census. In other words, those who had left by Census Day would not be included in the analysis, which minimizes downward bias.

Conclusion

With linked ILF-DAD data, it is possible to focus on immigrant categories and specific source areas. As Canada continues to meet humanitarian needs, and given more recent refugee movements from the Middle East, interest in examining refugee health outcomes persists. The ILF-DAD data covered the 1980-to-2008 period. Linkage of more recent refugees to hospitalization data will provide a clearer picture of their health and use of health care services. Because the experience of each refugee wave is unique, the results of this study cannot be generalized to current and future refugee populations. However, the same approach can be applied to evaluate their health status and use of services. ■

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Appendix

Table A

All-cause (excluding pregnancy) and leading cause-specific age-standardized[§] hospitalization rates (ASHRs) per 10,000 population aged 30 or older, Canadian-born population and refugee subcategories, Canada excluding Quebec, 2006/2007 through 2008/2009

	All-cause			Circulatory diseases			Digestive diseases			Cancer		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
	ASHR	from	to	ASHR	from	to	ASHR	from	to	ASHR	from	to
Canadian-born[†]	891.2	890.1	892.3	157.7	157.3	158.2	114.5	114.1	114.8	86.0	85.7	86.4
Refugees	493.5*	486.5	500.6	97.8*	94.5	101.2	67.0*	64.5	69.6	58.7*	56.4	61.1
Government-assisted	481.3*	470.4	492.4	90.2*	85.2	95.5	65.8*	62.0	69.8	58.9*	55.3	62.7
Privately sponsored	478.9*	467.2	490.8	93.9*	88.5	99.6	68.3*	64.1	72.7	59.9*	56.0	64.0
Landed in Canada	538.8*	523.5	554.6	118.9*	111.4	126.9	69.6*	64.4	75.2	55.8*	51.2	60.8
Dependant	484.3*	438.0	535.4	84.0*	64.6	109.4	41.2*	31.2	54.5	65.7*	50.4	85.8

* signficantly different from reference category ($p < 0.05$)

[§] standardized to 2006 Census population

[†] reference category

Sources: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009); 2006 Census linked to Discharge Abstract Database (2006/2007 through 2008/2009).

Table B

All-cause (excluding pregnancy) and leading cause-specific age-standardized[§] hospitalization rates (ASHRs) per 10,000 population aged 30 or older, Canadian-born population and refugee subcategories from Poland, Vietnam or Middle East, Canada excluding Quebec, 2006/2007 through 2008/2009

	All-cause			Circulatory diseases			Digestive diseases			Cancer		
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
	ASHR	from	to	ASHR	from	to	ASHR	from	to	ASHR	from	to
Canadian-born[†]	891.2	890.1	892.3	157.7	157.3	158.2	114.5	114.1	114.8	86.0	85.7	86.4
Poland												
Refugees	454.4*	437.1	472.4	93.2*	85.1	102.2	60.4*	54.6	66.8	64.5*	58.3	71.3
Government-assisted	436.3*	407.4	467.2	96.7*	82.9	112.8	51.7*	42.8	62.6	65.0*	54.5	77.6
Privately sponsored	459.1*	437.7	481.6	90.2*	80.4	101.2	64.3*	57.0	72.5	62.8*	55.5	71.1
Vietnam												
Refugees	375.4*	359.8	391.6	54.8*	48.8	61.5	52.7*	47.1	59.0	59.2*	53.5	65.5
Government-assisted	362.7*	341.2	385.7	45.5*	38.0	54.4	51.8*	44.1	60.9	59.5*	51.6	68.5
Privately sponsored	390.0*	367.8	413.5	63.9*	54.9	74.3	53.8*	46.0	63.0	59.2*	51.3	68.3
Middle East												
Refugees	605.8*	583.4	629.2	135.4*	124.4	147.4	76.9*	69.6	85.0	50.9*	44.9	57.7
Government-assisted	608.7*	573.4	646.1	141.7	124.0	161.9	79.7*	68.3	92.9	44.8*	36.3	55.2
Privately sponsored	614.7*	576.7	655.3	135.6*	117.8	156.1	79.2*	66.4	94.4	58.1*	47.7	70.8
Landed in Canada	576.4*	531.3	625.2	129.4*	107.7	155.6	65.8*	53.2	81.5	52.1*	39.7	68.3
Dependant	569.0*	440.7	734.6	...	...	...	...	...	...	...	...	...

... not applicable

* significantly different from reference category ($p < 0.05$)

[§] standardized to 2006 Census population

[†] reference category

Sources: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009); 2006 Census linked to Discharge Abstract Database (2006/2007 through 2008/2009).